

Ángel Calvo

University of Barcelona (Spain)

Consolidation and rationalization of the public companies in Spain: the information and communication technologies (ICT) holding

Abstract

This article aims to study a strategic sector in the first years of the new millennium, whose results have been already been partially presented. It is structured into four main sections, which include the introduction, a presentation of the public sector of information and communication technologies, the restructuring of the public sector of ICTs and the birth of the Inisel group, called to play an important role in the future for its leading role in the creation of the technological firm Indra. The article, which is predominantly descriptive in nature, combines industrial history with strategic management, and methodologically is a case study using primary sources of both public and private origin together with reports and studies from large international organizations.

Keywords: Public sector restructuring; Rationalization; Consolidation; INI; Inisel; ICT

Introduction

The thoughtful and in every sense devastating global recession of recent years has invigorated an already long-standing debate about the different impact of crises on the pace, magnitude and

Corresponding author: e-mail: angel.calvo@ub.edu

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manner in which restructuring decisions were made, a reflection of the diverse state of economic development and institutional characteristics, particularly the role of the state and the system of industrial relations (Eurofound 2015; Rose et al. 2000, 601-625)¹.

In this sense, the analysis of the differential characteristics of the high-tech firms has sometimes been tinged with prejudices about state intervention (Ordover and Willig 1999, 103-104). The article recovers the central debate on the growth model and on the characteristics of state-owned enterprises and their relative efficiency, which had its peak during the 1980s and the beginning of the following decade².

Something similar, on the other hand, has occurred with the endless academic debate on the restructuring of state enterprises, relaunched at that time, through the transition from central planning to market economies, for many the greatest social experiment in modern times, baited by the wave of privatizations under the Washington consensus and ignited by the growing weight of some BRICS or emerging economies (Abramov et al. 2017, 1-23). A debate, by the way, that in Spain had abundant ramifications, some from contributions of empirical evidence³. It might be worth considering particularly for our case the controversy on the privatization from an interdisciplinary approach, which has remarkable contributions (Clifton, Comín, and Díaz-Fuentes 2006a, 736-756; Clifton, Comín, and Díaz-Fuentes 2006b, 121-153; Clifton, Comín, and Díaz-Fuentes 2003). In Spain, the debate was often based on contributions that placed

¹ The European Commission considered in crisis a company condemned to disappear in the short or medium term without intervention by the state: European Commission (2014, 3-5).

² Vickers and Yarrow (1988), Pestieau and Tulkens (1993), and Martin and Parker (1997), among an extensive bibliography collected by Argimón, Artola and González-Páramo (1997, 5-6). As an example, several clue questions were analyzed by Bös (1986) and (1988, 409-414): the interdependencies with the private economy; adjustment to monopolistic pricing in the private sector as well as to rationed markets; managers of public enterprises and unions relationships; maximizing output or revenue, energy inputs and price indices.

³ Collected to satisfaction by Hernández (2004, 13-21).

advanced technology in the center, while at the same time stressing the role of the state and the risks of technological dependence⁴.

No doubt for visibility reasons, the study of the Spanish industrial reconversion has focused on the general aspects of the reconversion policies, sometimes in charge of prominent players in those processes (Aranzadi 1987, 162-163; Aranzadi 1989, 258-261; Aranzadi et al. 1983, 317-325; Boyer 2004, 239-304; Fernández Marugán 1992, 135-194; García 1989, 262-276; Guerra and Tezanos 1992; Solchaga 2017), and in energy sectors and heavy equipment. The advanced industries of the Third Industrial Revolution have remained at least marginalized from the attention of scholars, if not forgotten. This statement refers in particular to Information and Communication Technologies (ICT), whose interest has nevertheless increased among business history researchers (Haigh 2001)⁵.

This article aims to mitigate this unfair situation and examine the restructuring of public sector companies in Spain, focusing on the holding of ICTs of the Instituto Nacional de Industria (National Institute of Industry, henceforth INI).

⁴ Among a large list, see Buesa and Molero (1986); Molero (1988), and López (1992, 30-55).

⁵ Business history is one of the more relevant approaches followed by James Cortada addressing the history of computing (Cortada 1996a, 1996b); it predominates in Batiz-Lazo, B. and Boyns (2004, 225-232) and Batiz-Lazo (2009, 1-27). Of great relevance are the interdisciplinary approaches: business history of computer firms marries up with the development of key computing technologies in Campbell-Kelly et al. (2014); Aker (2006), mixes business history with several historical genres -biography and the institutional history of science; finally, Riordan and Hoddeson (1997) and Reid (2001) overview the history of electronic engineering and the business history of the electronics industry and the integrated circuit. IBM wins widely in the monographs devoted to individual companies. The overview of the firm's development, based on archival sources (Pugh 1995), centers on the relationships between the IBM's market positions, technologies, and internal dynamics. Two monographs devoted to individual companies other than IBM are those of Campbell-Kelly (1989) on ICL, and Norberg (2005) on two of the first startup companies in the industry -The Eckert Mauchly Computer Co. and Engineering Research Associates- which merged to found Univac. An attempt to overcome the dominant journalistic vision in Microsoft's story: Fisher et al. (1983); evolutionary economics: Lechman (2015); Garretsen and Brakman (2005).

The work is part of a broader project, directed to study a strategic sector in the first years of the new millennium, some of whose results have been presented to the public⁶. The issues addressed in the manuscript are of great interest -restructuring in a key sector with R&D intensive firms (telecommunications). Methodologically it describes the changes that have taken place in the ICT sector in two related aspects: strategy and organizational structure. It belongs, then, to the category of a case study, contextualized within a broader discussion on privatization as well as restructuring in Western Europe and predominantly descriptive in nature, straddling industrial history with strategic management.

The research draws furthermore on extensive primary historical sources of both public and private origin together with reports and studies from large international organizations. The paper is structured into four main sections, which include the introduction, a presentation of the public sector of information and communication technologies, the restructuring of the public sector of ICTs and the birth of the Inisel group, called to play a prominent role in the future for its leadership in the setting up of the technological firm Indra.

Before moving forward, it is advisable to lay down a series of preliminary considerations about the content and scope of the topic addressed in order to better track the story. Firstly, information and communication correspond to industries and companies that use intensive cutting-edge technologies, particularly electronics (Mohr, Sengupta, and Slater 2009, 9). As

⁶ Seminar “Industrialización, desindustrialización y reindustrialización en España. Lecciones de la historia reciente,” Universidad Complutense de Madrid, Madrid, April 20-21, 2017 and the session “Industrialización, desindustrialización y reindustrialización en España” within the XIIh Conference of AEHE. Lecciones de la historia reciente”, both organized by José L. García Ruiz and Jesús M^a Valdaliso to whom I thank your warm welcome to my work. To these papers I refer for a greater theoretical elaboration on the industrial policy and wider references to the existing bibliography.

regards size structure, in the Spanish electronics industry, small and medium-sized units predominated⁷.

Regarding terminological precisions, as established by the OECD, state-owned enterprises (SOEs) are characterized by significant control maintained by the state through significant total, majority or minority ownership. Such definition includes companies that are owned by the central or federal government, as well as state enterprises of regional and local governments (Sturesson et al. 2015, 8)⁸.

In this sense, the value of state enterprises in the OECD area exceeded 2 trillion dollars and an employment of 6 million people. But their importance is determined not only by the weight they have in the productive economy (average of 2.5% of national employment), but also by being highly concentrated in strategic sectors on which large portions of the private economy depend. Significantly, half of state-owned companies by value operate in network industries (telecommunications, gas and electricity, transportation and postal services) (OECD 2014). The strategic nature of the sector imposes a strong state intervention in its various facets of regulator, designer and policy inspirer, direct investor and buyer of products. In this last aspect, it is worth remembering the percentages higher than 70% of the total market in the communication equipment and minors in computers and office equipment of the large developed countries, with the sole exception of the USA (Locksley 1983, 74).

It seems appropriate to draw the European framework in a global context where games are being made more and more between USA and Japan⁹. In the world production, the European

⁷ There was only one of the top 50 in 1982, one of the top 25 in 1992, then there were five of the top 100: Buesa (1994, 12).

⁸ It is worth noting that the common definition for a public company is one that has issued securities through an initial public offering and is traded on at the stock exchange market.

⁹ Question écrite 3,690 de M. André Rouvière (Gard - SOC), *Journal Officiel du Sénat*, 4/12/1986, p. 1670; Réponse du ministère de l'Industrie, *Journal Officiel du Sénat*, 14/5/1987, p. 760.

electronics industry had significant positions in telecommunications equipment, medical informatics, professional equipment, and software and services. The European market share of 13,000 European information technology companies of all sizes gained eight percentage points from 47% between 1984 and 1989. At company level, Philips and Thomson were among the world's six largest consumer electronics manufacturers, and S.G.S. Thomson number two worldwide for non-volatile memories. However, the European trade balance remained strongly negative, with an overall coverage rate of around three quarters of the total¹⁰. Only four European companies were among the top 20 in the world semiconductor market in 1985: Philips (6th), Siemens (15th), Thomson (17th) and S.G.S. (20th). In France, Thomson acquired the North American Mostek¹¹.

As for comparative sense, some similarities and differences with other European countries are worth highlighting. The Italian case seems the most inspiring to carry out this exercise given the existence of a public body, which, on the other hand, had inspired the Franco dictatorship in Spain to create the INI. As for the similarities we find the existence of a telecommunication monopoly in the hands of the National Telephone Company of Spain (CTNE as the acronym of *Compañía Telefónica Nacional de España*) and STET, in Spain and Italy respectively. The differences point to several concerns. Firstly, it must be underlined the great boost given in Italy to the electronics sector after the oil crisis of 1973 –long before the Spanish efforts- although it was limited by inadequate public backing to R & D. Secondly, support for vertical integration should be highlighted at least in a double direction. The electronic division of IRI came under the control of the Italian operator STET to exploit the link with telecommunications, also

¹⁰ Question écrite 13,785 de M. Daniel Percheron (Pas-de-Calais - SOC), 9^e législature, *Journal Officiel du Sénat*, 14/2/1991, 289; Réponse du ministère de l'Industrie, *Journal Officiel du Sénat*, 28/11/1991, 2645.

¹¹ Question écrite 3,690 de M. André Rouvière (Gard - SOC), *Journal Officiel du Sénat*, 4/12/1986, 1670; Réponse du ministère de l'Industrie, *Journal Officiel du Sénat*, 14/5/1987, 760.

controlled by STET. IRI also took over Società Generale Semiconduttori (SGS), the largest Italian company in the field of electronic components, hit by the crisis after the withdrawal of the US founding group. This transaction differentiates between the two countries, since the electronic sector of Spanish INI lacked a component sector, considered as basic by the government and suffering from inefficiencies in size, technology and financial structure of the companies (Baumol 1980; Kumar and Anjali 1994, 60-109)¹². Some of the elements mentioned, particularly at the company level, point to certain interesting peculiarities that France presented, in the framework of a round trip nationalizations/privatizations. Beyond, one of the peculiarities of France was the existence of public R & D laboratories¹³.

Information and communication technologies at the INI

At the beginning of the decade of 1980, Spain aligned among the European countries with companies heavily owned by the state, although with a degree below the average of the EC¹⁴. The adjustment policies of the public sector are part of the broader reconversion carried out by the socialist governments in the 1980s, largely as an adjustment for entry into the EC. Data available show that GDP annual growth from 1979 to 1996 only overpass a three percent

¹² There were nine companies of electronic components, one of which – Piher- with four subsidiaries: Ministerio de Industria y Energía (1983, 163-164; 170-173). In 1993, the market for electronic components amounted to 168 billion pesetas, representing 14% of the total market, 15 percentage points less than ten years earlier.

¹³ Public R & D laboratories: C.E.T.-C.N.S. and C.E.A.-L.E.T.I. SGS-Thomson, for example, a national company, was considered a tremendous success of the French microelectronics because it was born in the public sector: Dominique Strauss-Kahn, Minister of the Economy, Finance and Industry, Senate of France, 11 December 1997; 26 April 1989, 398. SGS- Thomson expected to benefit from significant public aid (PACA region, DATAR, European Fund) to install a new semiconductor manufacturing plant near Aix-en-Provence: Senate of France, December 5, 1995, p. 3,840. While Thomson-S.G.S was transferring productions to Southeast Asia and the United States, it announced the elimination of thousands of jobs in Europe, as Siemens and Philips forecasted for their part: Thomson was purchased by Lagardère Group: *L'Économiste*, 24/10/1996.

¹⁴ State-owned enterprises/GDP in 1982: CE: 14.1%; Spain: 6.8%; Dehesa (1993, 131).

between 1987 and 1990, while in the previous period, from 1961 to 1978 GDP growth overpassed the three percent in each year¹⁵.

Some eight hundred companies in eleven sectors contemplated the Law of Reconversion and Reindustrialization of 1984, with an estimated loss of 830,000 jobs (Burgess 2004, 25-26).

Under Luis Carlos Croissier at the INI, the government promoted the recovery of the prestige of public companies. Secondly, it encouraged the privatization of numerous companies of the public group in which certain specialists point as a "dual process" of privatizations in the INI, which seemed to have expected the active participation of the autochthonous financial capital and that of foreign multinationals¹⁶.

Through successive transformations, the Spanish public productive sector was grouped into three holdings: the Group of the National Institute of Industry (INI), which was divided into two sub holdings and covered the basic and strategic industries; the INH Group, which brought together the hydrocarbons sector (oil, gas and petrochemicals) and the Patrimony Group, which encompassed service and banking companies (Aceña and Comín 1991, 539)¹⁷.

The electronics had arrived late and timidly to Spain, coinciding with the dawn of the democratic transition. Part of the efforts came from the public sector through the INI and indirectly through CTNE¹⁸. In subsequent years, the purposes of developing the cutting-edge technology and electronics sectors fell short. At the beginning of the new millennium, Spanish electronic production represented 5.5% of European production, 3.5 percentage points below

¹⁵ Carreras and Tafunell (2004); Bliss and Braga De Macedo (1990, 193) claim that the adjustment resulted in significant growth in the economy, at the expense of maintaining a high level of unemployment; see also Prados (2017).

¹⁶ This "dual process" of privatizations in the INI would have begun with a financial restructuring and followed with a sale to buyers who were favored by the operation: Heywood (1999, 171).

¹⁷ For an analysis of the restructuring of the public sector see Parker (2002, 200).

¹⁸ For an overview, see Duch-Brown and Fonfría (2014, 1).

the weight it had in the European market (Lawlor, Rigby and Smith 2005, 55-56). Given the modest place that European electronics occupied in the world market, we can conclude the Spain's scant relevance.

INI's commitment to information and communication technologies (ICTs) began in the 1970s via firms generally linked to the military industry, and some subsidiaries of foreign companies, which incorporated electronics into traditional technology and through creation or acquisition of new ones. We refer to the historical Experiencias Industriales (EISA), to Empresa Nacional de Óptica (ENOSA), created in 1951 with orientation to military optics, and to Equipos Electrónicos, S. A. (EESA), founded in 1971 by the French Thomson and acquired by the INI seven years later to strengthen the defense market (Molas-Gallart 1992, 64). For its part, ERIA (1973) emerged in the IT services sector, while Sociedad Española de Construcciones e Industria (Spanish Society of Construction and Industry, SECOINSA) was the large computer hardware company, the result of the technological-industrial-financial alliance with Japan's Fujitsu, the monopolist operator CTNE and a Spanish banking group (Table 1, Infogram)¹⁹.

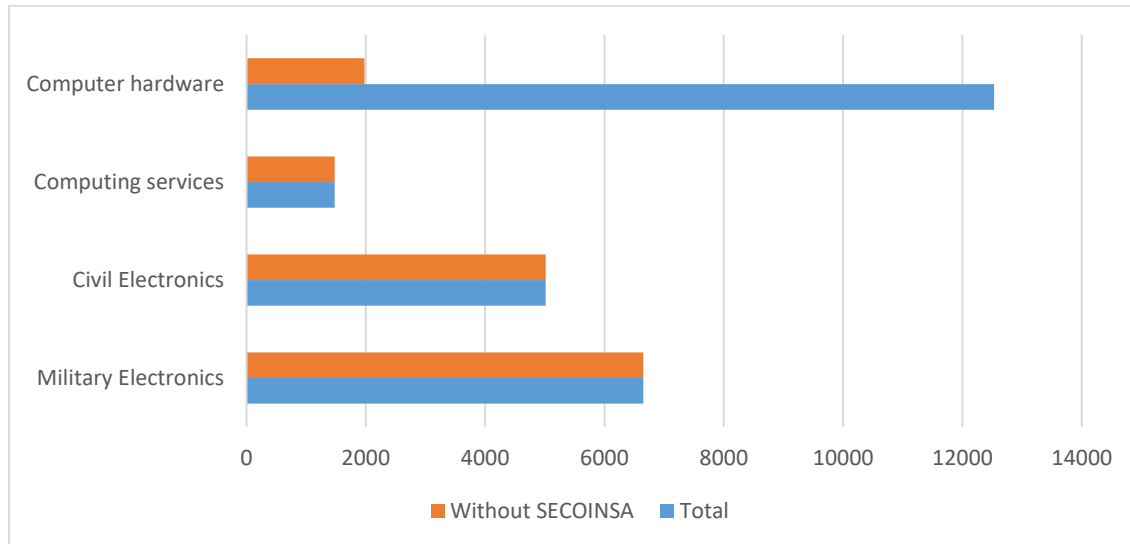
Table 1. Infogram with the historical evolution of the electronic manufacturing firms in Spain and the merger processes

Firm	Year of creation	Field	Ownership	Later ownership
Experiencias Industriales (EISA)	1921	artillery systems and control equipment for transport	EISA	
Empresa Nacional de Óptica (ENOSA)	1951	defense optics	INI	
Equipos Electrónicos S. A. (EESA)	1971	defense optics	Thomson	INI (1978)
ERIA	1973	IT services		

¹⁹ The group of banks was formed by the Hispanoamericano, Bilbao, Urquijo, Central, Santander, Vizcaya, Popular and Banesto: Calvo (2014, 222-224). After a period of marginalization of industrial defense policy, in the early years of the 1980s the Spanish government, very aware of Western military alliances, began to pay attention to this forgotten sector: Latham and Hooper (2013, 147).

Firm	Year of creation	Field	Ownership	Later ownership
SECOINSA	1975	computer hardware	Fujitsu, CTNE and Spanish banks	Telefónica
Estudios y Realizaciones de Diseño Informatizados (ERDISA)	1981	services to industry in electronics and computers	INI, Control Data Ibérica	
AEREA		software	INI	
ERVISA		computer-aided design and manufacturing	AEREA (INI)	
I Cuatro		electro medical equipment	INI	
Isel				
Pesa				
Telesincro	1963	computers	Joan Majó	Bull entry (40%)
Inisel	1985	professional electronics	merger of EESA and EISA	
Gyconsa	1991	defense equipment	Inisel/Hughes	Indra/Hughes
SADIEL	1984	society to promote investments	ERIA 10%	
Empresa Nacional de Ingeniería y Tecnología (INITEC)	1964	engineering services	INI	1999: Técnicas Reunidas and Westinghouse, which sold 25% to Dragados Industrial
DEFEX	1972		BAZAN, CASA, EISA, ENOSA and Santa Bárbara (51%)	
MICROCARE (USA)	1956	precision cleaning systems in electronics and the metal finishing industries	ENISA 33%	
SELESMAR	1980	marine radars and ARPA anti-collision systems	Segnalamento Marittimo ed Aereo (Florence)	EISA 20%
Eritel	1991	software for computers	Telefónica (39%) and the INI (51%) through ENTEL and ERIA	
Indra	1993	information and control technologies	INISEL (66.6%) and CESELISA (33.3%)	2/3 Inisel y 1/3 Ceselsa.

Source: Own elaboration from the text.

Figure 1. The electronics and computer division of the INI. Sales, 1984

Source: Own elaboration from *Reorganización de empresas electrónicas del INI. Creación de un holding en el sector electrónico-informático del INI*.

Let's place ourselves in 1984, taking advantage of a diagnosis and various recipes from the INI itself. At that time, the electronics area of the INI was composed of a set of ten public or mixed companies, belonging to three large fields -computers, electronics for the defense, and civil electronics-, from which consumer electronics and components were excluded (Figure 1). The main customers were diverse organisms of the national defense sector (Appendix 1 and 2)²⁰. Regarding the productive structure, the computer science area headed the activity of the division with 45% of the turnover, followed by the electronics for the defense with 30%, while the civil

²⁰ It had a sales volume of 25,576 million pesetas, of which 15.83% corresponded to exports, the order book stood at 26,275 million ptas., and employment at 3,581 people: *Reorganización de empresas electrónicas del INI. Creación de un holding en el sector electrónico-informático del INI*, INI Archives. As an example, EISA's R & D department employed 49 people in 1983, almost a quarter of which were senior graduates and 220 million pesetas had been allocated to it, 6% sales (the overwhelming majority for development and preparation of prototypes and the remaining 11 million for material investments in laboratory equipment); as for the origin, 79 million pesetas came from external financing (CAYCIT and CDTI, mainly): EISA (1984). Four years before, the share capital of the division was 3,266 million ptas., its sales were 7,688, and its R & D expenses 351 and its staff was 2,646 employees: *BIT*, 16, May-June 1981, 8-12.

professional electronics held the remaining 25%, in each case in approximate percentages. Some of these companies were leaders in their respective areas, as was the case with television equipment, with electromedicine and with digital communications, although here under a subsidiary leadership given that the industrial property of the product belonged to a shareholder of the company that developed it²¹. Already since 1983 the INI followed a policy involving the “reduction of losses and the formation of a profitable and competitive industrial group.”²² As a result, the expansive phase the electronic division experienced in the early 1980s took a sudden turn next. This was not seen by the heads of the division, who argued in favor of their arguments the increase in the volume of activity in terms of turnover by 25%, a notable export orientation - a quarter of the turnover - and an appreciable level of spending -7% of its sales approximately- on R & D or investments in technology. Linked to market and investment, R & D had the double facet of its increase and its strategic nature. The expense of the division for this concept increased by 6.5 between 1979 and 1984, from 184 to 1,193 million ptas. This came about in a country, Spain, whose industry made a technological effort that barely reached 0.3% of GDP, well below the surrounding nations. According to the same sources, all the companies of the division were going to finish the year of 1984 very close to the equilibrium point and in an optimum situation to obtain benefits hereafter²³.

²¹ Appearances of the Director of the Electronic and Computer Division of the INI in relation to the National Electronic and Computer Plan: Report of the Congress of Deputies proceedings (Diario de Sesiones del Congreso de los Diputados, *DSCD*), 226, October 23, 1984, 7, 90-7, 93. By number, the division amounted to 5 % of the total companies of the INI: *Informe anual sobre la gestión del sector público en 1985*, Congress of Deputies, June 27, 1990, p. 109.

²² *El País*, August 13, 1988. The Socialist Party, in office, expressed its support for an explicit strategy to achieve the best and most suitable implementation in the different subsectors of electronics and information technology: Speech by Eugenio Triana (Socialist Group), *DSCD*, 226, 23 October 1984, pp. 7,090-7,093.

²³ Appearances of the Director of the Electronic and Computer Division of the INI in relation to the National Electronic and Computer Plan: *DSCD*, 226, October 23, 1984, pp. 7,090-7,093; Appearance of the director general of electronics and new technologies, *Report of the Senate proceedings*, 111, November 19, 1991, pp. 31-34.

An argument wield against accusations of withdrawal referred to the strategy of diversification of activity and markets, together with the search for greater qualification in a dynamic sector, threatened by obsolescence. The decision to apply information technology and electronics to industrial productivity had resulted in the creation of a service company named Computerized Design Studies and Achievements (Estudios y Realizaciones de Diseño Informatizados, ERDISA) through an agreement with the company Control Data Corporation as a technological partner²⁴. The INI based its claim of being at the forefront of technology on the contribution of SECOINSA to the manufacture of the Tesys system, a technological development of the CTNE and node of the Spanish data transmission network. The activity of AEREA, software company of the division, was due to the development of a programming language, object of an export agreement with one of the most important North American multinationals of the software and that had managed to penetrate the world market. For its part, the subsidiary of AEREA, called ERVISA, provided services in the field of computer-aided design and manufacturing. The division also planned entering new fields, giving priority to computer-aided teaching and robotics. But significantly for its positioning in the market, the division aspired not so much to manufacture robots, despite having its own technology, but to offer the country an engineering skills in robotics²⁵.

The strategy of internationalization of activities was added to the demand for expansion, diversification and the struggle to be at the vanguard. In a group of relatively small size, this strategy meant not only the aforementioned export but also the establishment of bridgeheads or nuclei of expansion in the markets with the greatest potential. These were basically three,

²⁴ *El País*, December 7, 1983; *Spanish Economic News Service*, 38, 1-51: 9.

²⁵ Appearances of the Director of the Electronic and Computer Division of the INI in relation to the National Electronic and Computer Plan: *DSCD*, 226, October 23, 1984, 7090-7093.

certainly diverse: the United States of America, the European Economic Community (EEC) and Ibero-America. In the first, the division had two bridge heads, the beginnings of two actions and perspectives of a third. In the EEC, possibly in the Netherlands for fiscal reasons, the INI planned to set up a mixed software company in a technological alliance with a French group and from its own company. Regarding Latin America, already an important market, the intention was to create a platform, possibly in Argentina, for which institutional relations were being established with the government of that country²⁶.

The INI continued betting on a Spanish business group strengthened, consolidated, stable in the long term and capable to ensure, either alone or in partnerships, national participation in European industry and services. This required, however, to adopt divestment or participation measures in certain businesses (Salas 1991).

Later on the cuts continued, which the opposition did not fail to throw in the face of the government. In this regard, investments in R & D of the Ministry of Industry and Energy (MINER) suffered a significant contraction of 13%, equivalent to about 7,000 million pesetas (Triana 1991, 8-9; *Report of the Senate proceedings*, 111, November 19, 1991, 31-34).

The government then countered the attacks with the full force of the National Electronic and Information Plan (Plan Electrónico e Informático Nacional) for almost a decade and the launch of the Industrial Technology Action Plan (Plan de Actuación Tecnológica Industrial, PATI). Ascribed to an industrial policy, it was a three-year plan for 1991-1993 of a horizontal nature with the sole objective of achieving a significant increase in the technological effort of Spanish industry in various sectors - steel, footwear, textiles and capital goods. It was embodied in

²⁶ Appearances of the Director of the Electronic and Computer Division of the INI in relation to the National Electronic and Computer Plan: *DSCD*, 226, October 23, 1984, 7090-7093. Previous activity in the computer science of the semi-public monopolist CTNE in Argentina: Calvo (2016, 250-251).

specific plans, including the electronic and computer industry. Its figure in the initial year was set at 0.42% of GDP and 0.57% at the end. In total, the government hoped to mobilize public funds for a sum slightly higher than 150,000 million pesetas. The funds would come from four different sources: the MINER's own budget in the form of grants; soft loans from the Center for Technological and Industrial Development (Centro para el Desarrollo Tecnológico e Industrial, CDTI); resources channeled to Spanish companies by European Community and non-EU programs and other public contributions of different origins and modalities, including funds from budgets of autonomous communities or the state Administration²⁷. In reality, between 1991 and 1994, MINER allocated 23,000 million pesetas as a direct subsidies to companies to finance new product developments or improvements in production processes. In a reissue of PATI until 1996, 28,000 million pesetas were planned to subsidize the R & D of the companies. Nevertheless, the government admitted the low level of investment of R & D in the context of developed countries²⁸.

The restructuring of the public sector of ICTs

Returning to the sector that concerns us in the early years of the 1980s, reality left little room for doubt. In SECOINSA a capital injection of 5,000 million pesetas was envisaged by the INI in 1983, with a positive effect on the income statement then in the red. But the financial reinforcement was followed by divestment with the sale of the stake in SECOINSA to

²⁷ Comparecencia del señor director general de electrónica y nuevas tecnologías, *Diario de Sesiones del Senado (Report of the Senate proceedings)*, 111, 19 November, 1991, 31-34. In the autonomous communities and, as an example, the competitiveness plan of the Catalan industry included four areas of preferred action - internationalization, research and technology, services to companies, industrial and territorial rebalancing-, which distributed the bulk of 44,150 million ptas: Mosconi et al. (2001). It is worth remembering that the supranational European policy of R & D promotion responded to the failure of national policies: Kassim and Menon (2002, 228).

²⁸ *Desarrollo Tecnológico* 6, January 1994, 11-12, and 50; to this we should add the Industrial Quality Plan.

Telefónica, its main client. What in the INI was a stonewalling became into the CTNE, momentarily at least, in exponent of a firm policy of reindustrialization of the country, of integration of the performance of the operator and occasion to relaunch industrial activity, this time in alliance with the Japanese multinational Fujitsu, an aspect that deserves a separate study²⁹.

Telesincro, one of its subsidiaries, and Isel were to be integrated into a defensive and professional electronic and computer subgroup, which would also include EESA, EISA, Piher and ENOSA³⁰. In a first phase, the merger of EESA and EISA led to Inisel, which became the head of the group -on which we will return- key to defense electronics and one of the most significant companies in European electronics³¹. There were even episodes of internationalization in the primordial modality of industrial and technological alliances. Inisel was the industrial manager and main contractor in Spain to equip the ground stations of the

²⁹ The price to be paid by Telefónica to the INI for the purchase of the shares of the INI in SECOINSA was set at 1,411 million pesetas, equivalent to the total amount, of 2,234 million pesetas, less the payments that the INI should make to Telefónica for Telesincro, ISEL and Digi Power: *El País*, July 26, 1985.

³⁰ In 1980, the French Bull agreed with INI to start a phase of manufacturing its own products in Telesincro, which resulted in exports worth 4,300 million pesetas. Both partners planned to expand the collaboration with a technological and industrial agreement to boost the development of Telesincro, reinforced by the entry of Bull. This, a leader in European computing, aspired to further root its presence in Spain overflowing that framework through a minority stake in a Spanish company. For its part, the Spanish Administration intended to access a future European computer program to strengthen European competitiveness against the supremacy of the US and Japan. In 1984, the French company and the Spanish government agreed that Bull, then nationalized, would enter as a minority partner in the capital of the Spanish company Telesincro. Before the end of the assessment of the joint venture SECOINSA –parent company of Telesincro–, materializing the takeover of 60% of the capital by Fujitsu (the remaining 40% would be held by Telefónica) and be resolved at a legal level the transfer of Telesincro to INI: *El País*, May 6, 1985. The pact contemplated the possible entry of a third national partner. The business plan agreed between INI and Bull envisaged investments of 1,000 million pesetas in 1986-1988, providing Telesincro with a new factory and a newly created research and development center, which will initially be composed of 25 engineers and high level technicians. The budget of this center will be, in 1988, 8% of the turnover of the company: *El País*, March 23 and June 23, 1986.

³¹ INISEL (1992); *El País*, March 10, 1989; *ABC*, November 10, 1988. The creation of Inisel is a fact repeatedly collected in the international bibliography: Gummett and Stein (ed.) (2014, 206); Wilson (2013, 186).

military observation satellite Helios, a European project with an estimated cost of 160,000 million pesetas, led by France (79%) and from Italy (14%) and Spain participation (7%). The action of the Spanish government was pivotal here. First, to instruct Inisel to take part in an international defense program and form an international consortium to boost the on-board radar of the European Fighter Aircraft. The consortium with three other European companies - AEG (Germany), Ferranti (United Kingdom) and the FIAR of Marconi (Italy) entrusted a company, Eurofighter, with the mission of coordinating and subcontracting all project activities. Second, to support Inisel in the sealed of an alliance in the field of electronic warfare with the Italian company Elettronica, consisting of 51% of the Spanish company ELT, S. A., specialized in this sector and controlled by the aforementioned Italian company³².

In a situation where global defense spending tended to decrease, the cooperation efforts turn out to be very important. For its part, the aspirations of North American industry to gain a foothold in the European market offered favorable ground for such inter-company collaboration. Therein lie the ingredients of the "occasional" strategic alliance in two phases between the US multinational Hughes and Inisel. The first consisted of a triple shareholding movement - Hugues' entry as a minority partner in the capital of ENOSA, of the Inisel group-, the transfer of cutting-edge optronics technology from ENOSA to Hughes, and the manufacture in Spain of a new launcher of missiles TOW, this time in charge of Inisel with technological contribution of the partner. The agreement was completed with the joint development of a new

³² As a nominated national producer and participant in the two proposed competing systems, Inisel, like AEG and FIAR, was guaranteed its share in industrial production, regardless of the chosen radar system; on the contrary, Ferranti ran the risk of being excluded from participation in manufacturing: Disco and van der Meulen (1998, 91); Wood and Sorenson (2000, 59); Freedman (1999, 206); *Interavia*, 44, 1-6, 1989, 17. The partners of the consortium had to admit their limitations to develop such a sophisticated device. Entry in ELT S. A.: Ministerio de Industria y Energía (1990, 363); *Economia pubblica*, 21, 1991, 56; *Tecnología militar*, 13, 1991, 67; ELT, *Memoria anual*, 1991; *El País*, September 22, 1990.

anti-tank missile, which would be manufactured in Spain. With these premises, Inisel partnered with Hughes Aircraft Company Missile Systems Group in the joint venture company Gyconsa SA (Guiado y Control SA). The objective was to develop the Aries program, later replaced by the MACAM (Spanish acronym for Advanced Medium-range Anti-Car Mission) (MACAM-Archivado 9/2003, 2-3; Molas-Gallart 1992, 70)³³. The electronic and computer division of the INI was reinforced with new companies - Andalusian Society for the Development of Information Technology and Electronics (Sociedad Andaluza para el Desarrollo de la Informática y la Electrónica, SADIEL), and Piher Electrónica S. A. Inc. (PESA), to name the most outstanding³⁴.

Towards the end of the 1970s, INI created a new direction to coordinate activities in the fields of engineering, electronics and information technology. There is the ferment of the new and aggressive National Enterprise of Engineering and Technology (Empresa Nacional de Ingeniería y Tecnología, INITEC), provider of engineering services in the national and international market, including nuclear power plants, conventional thermal and hydroelectric plants. Outside Spain, INITEC sold his technology and know-how to South America, Europe, the Middle East and Africa. It was subjected later to a process of adjustment, which was aimed at economic consolidation. From then on, INITEC and ERIA, SECOINSA, ENOSA, EESA and

³³ The new missile should compete with the European project Trigat (Germany, France and the United Kingdom), abandoned by Spain at the end of 1989: *El País*, May 11, 1991. In 1992, Gyconsa SA received from the Spanish government a contract of 20 million \$ to supply a new light launcher for the Spanish TOW 2B missiles and develop a third generation antitank system, MACAM, contract valued at 4.85 million. In 1997, ENOSA contracted with Kuwait the supply of its light launcher TOW: MACAM-Archivado 9/2003, 2-3. In the example of Spain, between 1985 and 1993, the share of military spending in GDP fell by one percentage point -from 2.2% to 1.2%; between 1982 and 1993, the percentage with respect to the total budget fell to less than half - from 11.5% to 5.1%: Canales and Elices (1994, 107).

³⁴ Between 1980 and 1984 the average cumulative growth of the group of companies was 32% in sales, 150% in cash-flow and 6% in employment.

EISA, along with other similar ones, would act in an integrated manner. INITEC was sold to Westinghouse and Técnicas Reunidas in the last year of the decade (Muller 1991, 104; Tribunal de Cuentas 2007, 15.)³⁵. In addition to this restructuring, the INI took over the majority in SECOINSA. Then, in 1980, the INI undertook the third phase of its internal reorganization, which meant the creation of a Financial Committee, the increase of the six existing divisions since 1979 with nine more and the suppression of the sector directorates that still subsisted. This is context of the creation by the INI of a Division of information and communication technologies (ICTs) with the mission of strengthening and coordinating the presence of its companies in the sector, which began in the 1970s.

The participatory structure of the ICT Division obeyed a complex scheme based on three levels of dependency and a very diverse set of inter-company relations. The first and second level included companies of the first hour and on which the rest depended -EESA, EISA, ENOSA, ERIA and SECOINSA. The division was completed with a quartet of companies formed by DEFEX (EISA and ENOSA), the North American MICROCARE³⁶, SELESMAR and

³⁵ Several job cuts occurred, first under public ownership, in 1987, affecting five hundred workers and in the privatization process with a downsizing of 189 through voluntary redundancies and early retirement: *El País*, 9 December 1987. Two thousand experts in more than twenty different fields and experience evaluated in hundreds of projects placed INITEC in a prominent place among Spanish engineering companies: *Información comercial española*, 564-568, 1980, 245. The drastic collapse in the demand for energy products (especially services for nuclear power plants) led in 1988 to an adjustment process, boosting other products with innovative technological content, whether derived from traditional or new activities. INITEC's investment in R & D in 1989 amounted to 245 million pesetas and was mainly focused on projects and programs in the field of energy, the environment and new products, as well as a policy of technology transfer and cooperation International Technology: *Official Bulletin of the Cortes Generales-Congreso de los Diputados*, 89, September 12, 1990, 200. The analysis of privatization is left out of this study.

³⁶ MICROCARE: 33% from Empresa Nacional de Innovación (ENISA) that served as a channel to create Incipresa - manufacture company of fire protection equipment- in partnership with the German multinational Preussag (80%) as matrix of the direct participant Pefripesa, and the public company Sodiga: *El País*, 1 March 1985.

SADIEL, and I4, specialized in electromedicine and electromedical equipment) (Cantoni et al. 2011, 610)³⁷.

The projected consolidation process by the creation of a Spanish software consortium as part of the restructuring of the industrial activities of the autochthonous electronic sector suffered several delays. After overcoming uncertainties and doubts, Telefónica and the INI reached an agreement to restructure the telecommunications sector with the involvement of the respective companies of both groups. The agreement revolved around the axis of the double need to concentrate industrial groups to promote specialization and avoid overlapping while resizing the industry in an attempt to gain competitiveness.

In 1991, Telefónica and the INI added the assets of their respective subsidiaries ENTEL and ERIA according to the integration modality³⁸. This is how Eritel was born, controlled mainly by the INI through Inisel, with the task of developing software for computer applications. Telefónica and the INI maintained a tenacious pulse for the control of the new large company, due to the strategic nature of their respective subsidiaries and the amount of capital committed³⁹.

³⁷ *Reorganización de empresas electrónicas del INI. Creación de un holding en el sector electrónico-informático del INI*, 223, 614, 01927, Historical Archive of the INI, 14-5/1985-21/5/1985.

³⁸ Eritel (1991); *Actas Consejo Telefónica*, 20/12/1989; *AEC*, 11/7/1990; Telefónica, *Memoria*, 1989, 17-19; "Appearance of the President of the National Telephone Company of Spain, Mr. Luis Solana Madariaga", *Report of the Senate proceedings*, 93, 14/2/1986, 1-26; *Expansión*, February 1, 2015. The creation of Eritel was presented as the biggest event of those years: *Jane's Defense Weekly*, 17, 1992, 1034; it was advertised as an "integration for quality", a company of dimension and experience, highly qualified (2,000 professionals) "official supplier of communication systems and information to the Olympic family" and "strategic ally" of its clients: *La Vanguardia*, May 13 and June 17, 1991.

³⁹ Participation in the merger between Eria and Entel: Inisel (INI) 51%, Telefónica 39% and several banks and the French Cap Gemini the remaining 10%: *Tecnología militar*, 12, 1990, 5, 75. The consolidation of the public sector advanced with an agreement between Inisel and the private Ceselsa, which paved the way for the merger in a single group to form the new technological Indra, and a shareholding between Sainco and Inisel: Lane (1997, 279); Boix (1998, 105-130); Mallin (2006, 87). Pressure from the Ministry of Industry to accelerate the merger and opposition of Telefónica to integrate communications software activities: *ABC*, June 11, 1989; difficulties and interruptions: *El País*, March 25, 1990.

Integration and concentration of the public sector of ICTs in Spain: criteria, choices and reorganization proposal

Let's take a look at the ins and outs of the restructuring of the electronic companies of the INI and the creation of a holding company with its own financial resources and through self-financing plans. It was a process that led to a new head company, product of the absorption of EISA by EESA and the acquisition of the rest of the companies in the Division -ENOSA, EISA, I4, ISEL, PESA and Telesincro- that became subsidiaries, taking advantage of the fiscal advantages.

The objective was multiple, beginning with the rationalization of the INI's presence in the electronic industry in response to the need for greater coordination and better definition of strategies in the precise defense market. In addition, it advocated integrating R & D capabilities to optimize resources, limit the dispersion of actions and obtain economies of scale without forgetting the rationalization of basic actions -investments, commercialization purchases and human resources. Finally, it sought cohesion in dispersed activities in relevant fields such as industrial automation, as well as the most coherent allocation of markets, avoiding duplication of actions and self-competition scenarios⁴⁰.

We must remember that the electronic sector had as a peculiarity the great speed of technological change together with strong competition from the international industry. The strong growth of the INI's division brought to light unforeseen problems at the time of its creation, essentially the structure not suited to the needs.

⁴⁰ Reorganización de empresas electrónicas del INI. Creación de un holding en el sector electrónico-informático del INI, Historical Archive of the INI,, 14/5/1985-21/5/1985.

Taking into account aspects previously mentioned, the INI Division had the mission of coordinating companies whose relatively small size made it necessary to optimize resources and potential in markets, investments, R & D and personnel, among other aspects. In markets because the acquisition of related technologies and the logical extension of activities by different companies had led to an overlap of products. These included lasers in ENOSA, consoles for presenting data in EESA and EISA for developments for civil aviation and naval programs, respectively; radars for developments for civil aviation and for applications for the infantry, as well as television transmissions in EESA and PESA. In addition, industrial automation or robotics in several companies opened the possibility of new overlaps, which only integration could avoid. The need for optimization extended to investments because the use of new technologies by different companies required large amounts of money, sometimes duplicated and out of reach of the whole.

If we go specifically to the criteria, the restructuring of the electronic and computer division of the INI pursued several objectives. They included rationalizing the offer from the various companies in the group; technological complementarity and specialization; the use of common resources and capacities in order to optimize their use and allow shared access to unavailable resources to an individual initiative; the coordination of actions of international projection that guarantee their viability; agility and decision-making in the mechanisms for making investments, launching new activities, commercial action, purchases, making use of human resources, together with the allocation of resources based on the needs derived from a joint strategy.

The lack of integration of the companies caused the loss of economies of scale, the duplication of activities and resources and the dispersion of effort in small units. The achievement of these

economies of scale was also possible through the coordination of purchases, which in 1984 had saved 500 million pesetas.

The alternatives looked at a holding company or a sole proprietorship and sole or majority shareholder in the rest of the companies. The holding company, contemplated in a project of the Division dated November 1984, was justified in terms of optimization of technology applications and in the existence of specific activities that SECOINSA would have to carry out in the field of information technology, non-existent reasons once SECOINSA belonged to the INI. Against him was the inconvenience of the cost, increased by the exclusion of SECOINSA from the group. The option contemplated by the head company was based on the existence of two companies of comparable size and activity, namely EESA and EISA. It allowed to take advantage of the existing resources in it to reach the objectives and take advantage of the homogenization in markets and dimension achieved with the departure of SECOINSA from the division.

Regarding the reorganization proposal, the alternative of the head company as the parent of the holding envisaged the EESA-EISA merger according to two basic criteria. The first combined a similar dimension between the two, complementarity of their respective markets, strong dependence on the same client and common perspectives for the future. The second translated the governmental impulse to the development of a national defense industry, a field to which the aforementioned companies contributed almost a third of their turnover. The differences between them were compensated with complementarity, visible in the more mechanical orientation of EESA and more EISA electronics. The objective revolved around avoiding duplications and achieving size.

If we consider the content of the integration, the double industrial location of the EESA and EISA plants should be maintained with optimization of their relative specialization. In addition, greater efficiency and a more rational allocation of resources asked for a unification of the remaining functional activities. On the other hand, it was important to unify the respective departments of R & D, action with positive effects on the serious problem of hiring technical personnel to Aranjuez (Madrid), a city in which EISA occupied the second position among the large companies. It was also convenient to generate developments in microelectronics in response to future needs. Regarding management, the holding company had to have a structure capable of structuring and coordinating access to large business areas in a multi-company framework. These included a prominent defense and robotics and were completed with several others, including television, electromedicine, engineering and computer services. The holding company had to acquire coordination capacity in areas such as planning, technology, purchasing and human resources. The rationalization should be extended to the allocation of markets and activities of all the companies.

Of the two open possibilities for the EESA-EISA integration (merger and absorption) the optimum was the second for the fiscal benefits: maintenance of the right to compensation of losses in the corporate tax to safeguard society and a bonus of up to 99% provided for in law 76/1980 for mergers of companies of national interest. Added to this were organizational reasons, such as the reduction in the number of executive and administrative units -as reported by the division-. Once the absorption was chosen as a form of integration, deciding the absorbing company and the dissolved one depended on the lower fiscal costs. In that sense, EESA had to absorb EISA to maintain the right to compensation for losses existing in EESA.

With regard to the general financing scheme, the holding company was created through two types of transactions, namely, the transfer by the INI of direct shares in companies and the "purchases of the holding company from the other companies of its interests in indirect companies". The disbursements to be made had a dual origin: one of the purchase action and another fiscal. The acquisition of company shares, i.e., the purchase of shares of ISEL and PESA held by ENOSA and ERIA, should be supported by the holding company, with the exception of the fiscal costs derived from a commercial purchase operation, which should be charged to of the INI.

There remains a reference to the stages. The holding company was to be constituted in three successive: absorption of EISA by EESA, acquisition by the absorber of the indirectly owned companies by the INI -ENOSA, ERIA and PESA in ISEL- and purchase of the direct ones - ENOSA, ERIA and TELESINCRO. In the first stage, the fiscal cost of the capital increase in EESA to acquire the assets of d, after termination of this, amounted to 4 million pesetas, including fees; the second stage required the holding to pay out 98.3 million pesetas for purchases of indirect INI holdings in PESA and ISEL, which would be covered by self-financing in the amount of 98 million pesetas and by disbursement of the INI from the small remaining amount in concept of fiscal cost and fees. The third stage settled the transfer of the INI to the holding of its portfolio of securities in the direct investees ENOSA and ERIA, jointly valued at 612 million pesetas. In addition, it entailed the expansion of the holding's assets through the acquisition of TELESINCRO, the participation of SECOINSA in ISEL and the shares of INI in ERIA through INITEC. This capital increase had to be covered via capital increase with fiscal costs of around 40 million pesetas. The total cost to be covered by the INI

was 60 million pesetas in cash, 98 in the form of self-financing and a transfer of the INI's securities portfolio for 3,657 million pesetas.

Table 2. Reorganization of the INI electronics division (millions of ptas.)

	Financial investment	Fiscal coste; fee	Total financing
Absorption of EISA by EESA	2,562	4	2,566
Indirect acquisition ISEL and PESA	98	0	98
Direct acquisition ENOSA, TELESIA and ERIA	1,111	40	1,151
Total	3,771	44	3,815

Source: Own elaboration from the Historical Archive of the INI.

The reduction of fiscal costs brought to discard the integration of the two companies as a procedure and to create in its place a society, heir to the patrimonies of both. This new company, already with the possible name of EESA-EISA in order to preserve the two commercial names, had to acquire the shareholdings at that time corresponding to the INI in the direct companies ENOSA (100% of the capital) and ERIA (61.8%), as well as in the indirect PESA (75%) and ISEL (84.5%). For its part, the holding company should integrate Telesincro, the shares of SECOINSA in ISEL and those of INITEC in ERIA.

The legal Advisory of the INI opted for the holding company, which required the approval of the government to the whole operation due to the importance and the regulations of the INI in force as well as the respect of the current legislation - law of companies and tax regime of mergers - and the status of workers. The Advisory presented the reasons and basic elements of the proposal for the creation of the holding. According to this body, the study of the director of the division of computer electronics was based on legal reasons, focused on the lack of legal personality and the complexity of financial participation in the composition of the division. The Advisory body denied the current organizational system, ie the division, effectiveness to develop multi-company projects especially in foreign markets, lacking legal personality. The

complexity of the organization chart of financial holdings in the composition of the division reduced opportunities for the exercise of an effective control and the weighted allocation of resources among companies depending on whether they were direct, indirect or indirectly participated (Asesoría jurídica 1985).

Birth and growth of the Inisel group

Inisel presented the INI with a proposal for an organizational plan that clarified the previous organization chart submitted for approval on October 9, 1985, and above all justified such an organization chart, including definitions of functions or activities to be carried out in the main units in the new organization chart or in the context of the definitions of functions or activities. Inisel picked up the suggestions made at the time by the management and structure management policy. In the new proposal, up to seven main objectives to be achieved in the organizational aspect were completed. In essence, they entailed the creation of an industrial group subject to a common business strategy and action with a flexible hierarchical and organizational unit to respond to emerging and very changing markets, composed of operational management units lightened of non-executive functions and with management and executive units of command clearly defined.

The organizational scheme contained in the proposal basically saw eye to eye with the previous one and consisted in the creation of three operational managers, a common economic financial management, an executive committee, a steering committee, a technical and prospective planning management, an address of human resources and a corporate policy unit.

The proposal also included the organization charts and brief descriptions of functions or activities to be carried out by the main units. Finally, a plan for the implementation of the proposed organization was indicated. The main suggestion made by the Directorate of structure

and policy of executives was that even if each management was engaged in a different business, it would seem necessary to coordinate the commercial policy: this function was assigned although it did not appear specifically in the job description to the Management of technical planning.

The scheme contained in the report determined the functions of the three Inisel businesses and had a small number of central units. In any case, as foreseen in the implementation plan, the description of functions of the main units should be developed conveniently to define with sufficient clarity in operational operation⁴¹.

In short, Inisel was shaped as a dynamic and diversely articulated conglomerate of companies dedicated to the design of professional electronic systems, both civil and military. Its clientele was composed predominantly of large private and public companies with a strong technological component (Ballart 2001, 124)⁴². The firm was governed by an executive presidency from which the legal advice and the secretariat of the Council and the direction of technical planning, on the one hand, and the corporate policy and directions of human and economic-financial resources were based. The Group was integrated by ENISA, I4, PESA and its subsidiary PESA-Miami, ISEL, Telesincro and FRIASA with its subsidiary ERDISA. Its product line consisted of military products, defense systems, space equipment, civil systems and industrial electronics. In turn, the former included ammunition, tactical communications, firing directions, submarine electronics and missiles; the latter grouped avionics, radars, electronic warfare, automatic measurement systems and data transmission systems; third parties, earth stations and satellite equipment; the latter comprised industrial automation and industrial process control⁴³.

⁴¹ Propuesta plan organizativo Inisel y su grupo industrial, Historical Archive of the INI, 21/11/1985.

⁴² The great press was airing: 'the Inisel concern is building an automated factory to make electronic equipment, in cooperation with France and Italy, *New York Times*, March 23, 1986.

⁴³ *Boletín informativo*, INISEL Group, December 1985, 4.

Inisel carried out a diagnosis of the group's situation, as a step prior to a strategic reorientation. A state of affairs too dispersed, disorganized, with excessive lines of business unclear was found. From this arose a consensual orientation to the reordering, especially considering that the sector was concentrating at great speed worldwide (Ballart 2001, 125).

As a result, Inisel suffered significant changes in the organizational structure, the basis for changes in the work systems of the group. Firstly, it was a generational change in the management team, grounded on the internal promotion of young professionals but with specific technological knowledge in substitution of senior management, barely oriented to the market and with low recycling options. Regarding changes in work systems, Inisel was inclined to focus on results, developing more agile coordination mechanisms and implementing a monthly reporting system, prioritizing customer satisfaction. In other words, it guided company managers to define specific objectives and to systematize operational monitoring mechanisms that measure achievements. It involved the selective rethinking of the activities in which Inisel participated, with the consequent rejection of certain lines of business to focus efforts on other (Ballart 2001, 129).

Conclusion

This article brings us back to the beginning of the debates on the reconversion policies in Spain and on the role of high technology in them. It has addressed the reshaping of the public electronic industry after the sudden turn that followed the expansive phase experienced in the early 1980s, focusing on the electronics and computer division of the INI, comprised by small and medium-sized public or mixed-capital enterprises of modest quantitative importance but of enormous strategic salience. It has centred on the reorganization process of the division, with its various privatizations and mergers, as well as on strategic alliances with technology partners.

The article has analyzed the nation-state component of crises and industrial restructuring based on a case study, centered on the Electronics and Computer Division of the INI, one of the three major restructuring of ICTs in Spain, together with those of private groups of Telefónica and International Telephone and Telegraph. Specifically, it has studied the relationship between cutting-edge technology and organizational structure, while also delving into the various alternatives to this relationship. The chosen chronological cut is part of the globalization stage of the economy and includes the period between the incorporation of Spain to the European Union and its full integration and, therefore, implies the policies of prior readjustment, the submission to the European guidelines and the use of horizontal and sectoral plans (Henderson 1991).

The empirical evidence shows that the Spanish industrial restructuring, in times of crisis and globalization, managed by State was not oriented to pave the way for subsequent privatizations but in search of greater competitiveness -consolidation and rationalization- of the public sector. Evidence presented shows the connection of the sector with the military industry, possibly one of the main strategic reasons for the ICT sector to remain under public control. It must be said, however, that some companies have ended up in the private sector, as it happened to INITEC, and others have served as a basis for creating joint companies, as it was the case of Indra.

The processes described here to define the behavior of the INI in the ICT sector seem to fit appropriately in terms of consolidation of companies, rationalization search for economies of scale to compete in open markets and internationalization.

In short, what has been investigated here is the configuration of a Spanish group specialized industrial group, which currently has a rather minor relative importance in the international scene.

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Appendix 1. Customers of EISA. Balances, December 1983 (million pesetas)**Defense sector**

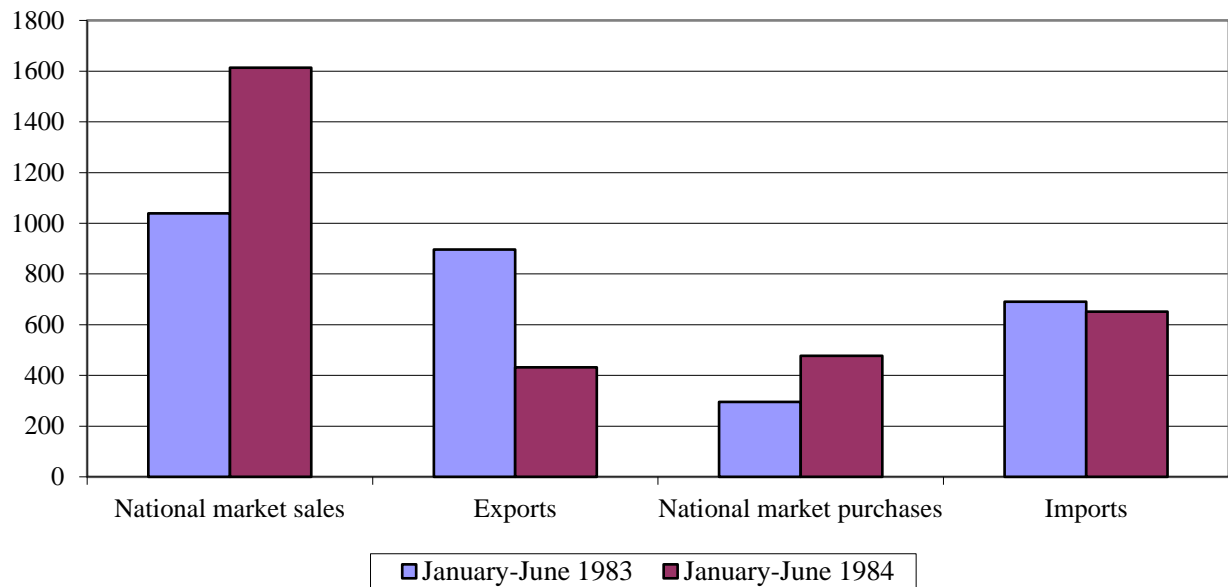
Artillery Academy	0.9
Military Naval Arsenal	0.3
General Headquarters of the Navy	872.1
General Headquarters of the Army	169.4
Armored Division	0.6
Air Force	1.8
Artillery Park of Valladolid	0.9
Central Artillery Park	4.1
Park and Maestranza Artillery of Madrid	0.2
Park and Maestranza Artillery of Sevilla	12.7
Military Division	0.5
U.J.T. and Joint Artillery Regiment	0.1
Nuclear Energy Board	2.2
CETME S.A.	1.5
Empresa Nacional Santa Bárbara	43.4
Traffic General Office	85.0

Civil sector

Division I+D	2.5
Ministry of Industry and Energy	0.2
Ministry of Transport and Communications	9.0
RTV	0.6
RENFE	1.1
Astilleros Canarios S. A.	2.3
Astilleros Españoles	5.9
Auxini	0.3
CASA	10.5
ENISA	2.6
ENAGAS	0.2
Empresa Nacional Bazán	88.5
Empresa Nacional de Uranio	12.1
Traffic General Office	85
Gas y Electricidad	6.1
Hunosa	0.2
Unión Eléctrica de Canarias	2.4

Note: Empresa Nacional Bazán: central (35.1) and facilities in San Fernando in the southern province of Cadix (49), Cartagena (4) in the east, and El Ferrol in the northern Galicia region (0.4).

Source: Own elaboration from EISA, Información correspondiente a 1983 (Information corresponding to 1983), p. 19.

Appendix 2. EISA Market, 1983-1984

Source: Own elaboration from EISA, Information corresponding to 1983, June 1984, 19.

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